Indian Journal of Social Research Vol.50 (1) (Jan - March, 2009) (1-14)

PRA METHODS FOR STUDYING THE IMPACT OF TECHNOLOGY ADOPTION IN CROP AND POULTRY ENTERPRISES IN A RURAL VILLAGE

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INTRODUCTION

PARTICIPATORY rural appraisal (PRA) methods have of late been highly successful in bridging the gap between development functionaries and target groups for whom the development strategies and efforts have been focused at. PRA describes a growing family of approaches and methods to enable local people to share, enhance and analyze their knowledge of life and conditions, to plan and to act. (Chambers, 1994).

Non-governmental organizations (NGOs) quickly responded to PRA and adopted simple participative methodologies involving disciplined observation, accurate recording and common sense analysis (Korten, 1989). Indian farming is basically a subsistence farming. But due to adoption of improved technologies in all areas of production, productivity of crops and livestock has increased substantially, the total production has increased several times and marketable surpluses with farmers have also increased. Indian farming is a mixed type of farming. They keep few milch animals and undertake goat keeping, poultry to supplement incomes from crop production. Hence decision making on technological adoption is more difficult and complex than on specialized farming.

Identification of the improved technologies in crops and animals and the criteria for their adoption through matrix ranking and the

consequence of the technology adoption play a vital role in technology refinement and technology development.

METHODOLOGY

The present study was undertaken in Maroorpatti village in Namakkal district of Tamilnadu. Maroorpatti village has a total geographical area of 650 acres with a population of 1350. The major occupation of this village is agriculture followed by poultry farming. The important crops of this village are Tapioca, Groundnut and Sorghum and the livestock ownership mainly consists of poultry layers, followed by cattle.

The study was conducted by a team of multidisciplinary scientists. Relevant PRA techniques such as technology map for crops, technology map for animals, matrix ranking, consequence /impact diagram were used to collect information on technology decision behaviour, criteria for technology adoption and consequences for adoption of improved technologies. Technology maps for crops and animals were separately drawn, in order to depict the technologies that were found in the village as well as the technology decision behaviour of the farmers. In other words the technology map of the village was used to indicate the technologies that were adopted, discontinued, over adopted, rejected and reinvented for different crops and domestic animals. The technologies in crops and animals were identified by systematically walking with informants (transect walk) through the village and by observing, asking and discussing with the key informants. As a next step, matrix ranking was done separately with respect to crops and animals. The matrix ranking was done to find out the reasons for specific type of behaviour of farmers with regard to technology decision with respect to crops and animals. Following the construction of matrix ranking in crops and animals, the consequence diagram for crops and animals was drawn.

FINDINGS AND DISCUSSION

Technology map of crops is represented in figure 1.

This map is a pictorial representation of the different kinds of technologies used in the different types of crops grown in the village, and the levels of adoption used in each technology and crop. Adoption is defined as the continued use of a technology as the best course of action. In other words the technology map of the village is used to

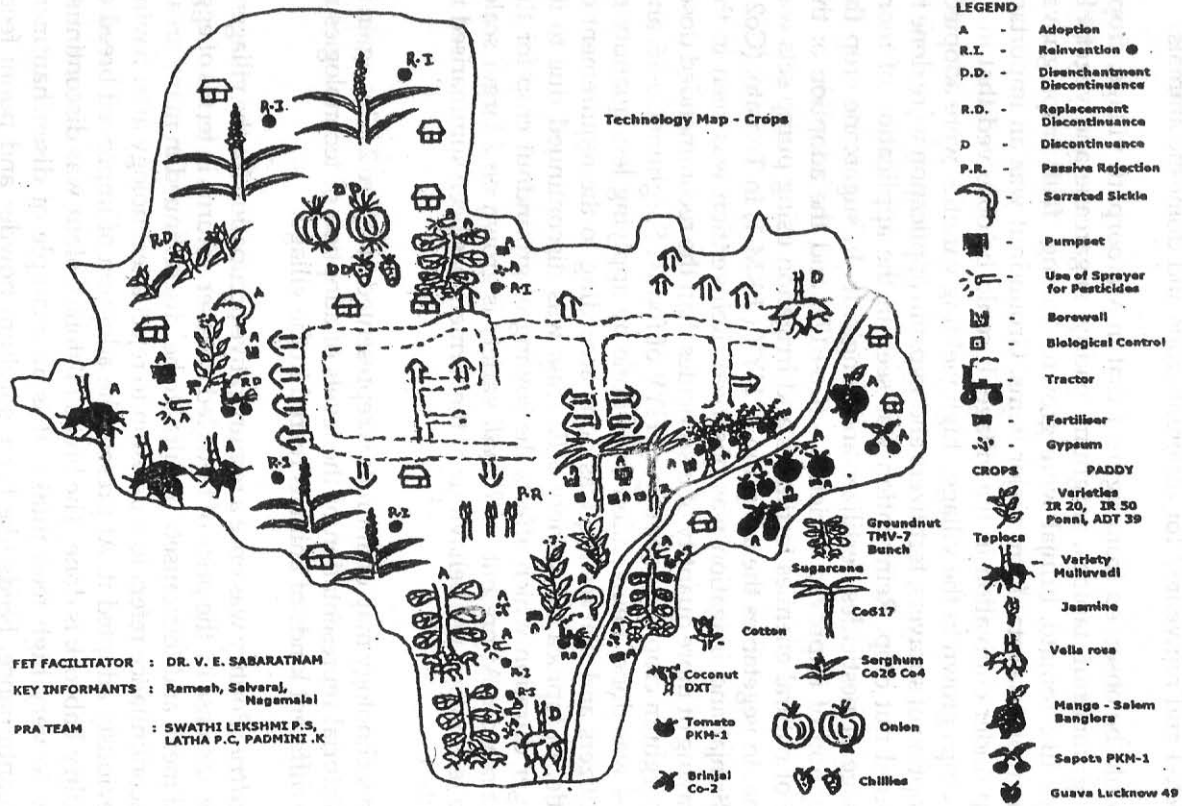

Fig. 1 : Technology Map - Crops

indicate the technologies that are adopted , discontinued, over adopted, rejected and reinvented for different crops and domestic animals.

It could be observed from figure 1 that in Maroorpatti village, crops like groundnut, tapioca, sorghum, paddy, sugarcane and vegetable crops like tomato, brinjal were grown. Among fruit crops guava, mango and sapota form major items. Groundnut was an important crop under cultivation in the village. It could be observed that in all the crops grown in the village, high yielding varieties were adopted. Adoption of sprayers, fertilizers and gypsum application were done in ground nut crop. Reinvention was seen in the application of more dosage of pesticides, fertilizer and fungicide. In sugarcane crop the adoption of improved varieties – (Co-617) and the adoption of the use of natural enemies fertilizers and irrigation using pump sets was done. In vegetables the adoption of HYV (PKM-1) in Tomato, (Co2) in Brinjal and irrigation was observed. Reinvention was seen in the spraying of more quantity of insecticides than the recommended dose. In sorghum crop the adoption of HYV of fodder Sorghum Co-26, and Co-4 was done. Reinvention was done by applying less quantity of fertilizers and harvesting was done according to the requirement of cattle. In tapioca the variety *vella roasa* was discontinued due to its longer duration which affects the sowing of groundnut crop for the next season. At present *mulluvadi* variety is grown on a larger scale. The technology use behaviour of the farmers has been summarised in Table 1.

The technology map of animals is represented in figure 2. This again is a pictorial representation of the levels of adoption of technologies in the different kinds of animals reared in the village.

Poultry : Poultry was once a remunerative occupation for the villagers. The increase in the price of feeds led to lesser returns in terms of eggs and meat, and this caused poultry to be discontinued in many areas. Discontinuance refers to a decision to reject a technology after having previously adopted it. At present the adoption of improved breed of poultry Babcock is done. The breed Histone Colour was discontinued due to very high feed intake. It is an example of disenchantment discontinuance. Feeds like bran, sorghum powder and ponni feeds were given to the poultry. Use of improved watering facilities like drinkers was done. Adoption of vaccination for IDB, Ranikhet and deworming was also done. Reinvention in terms of feed quantities

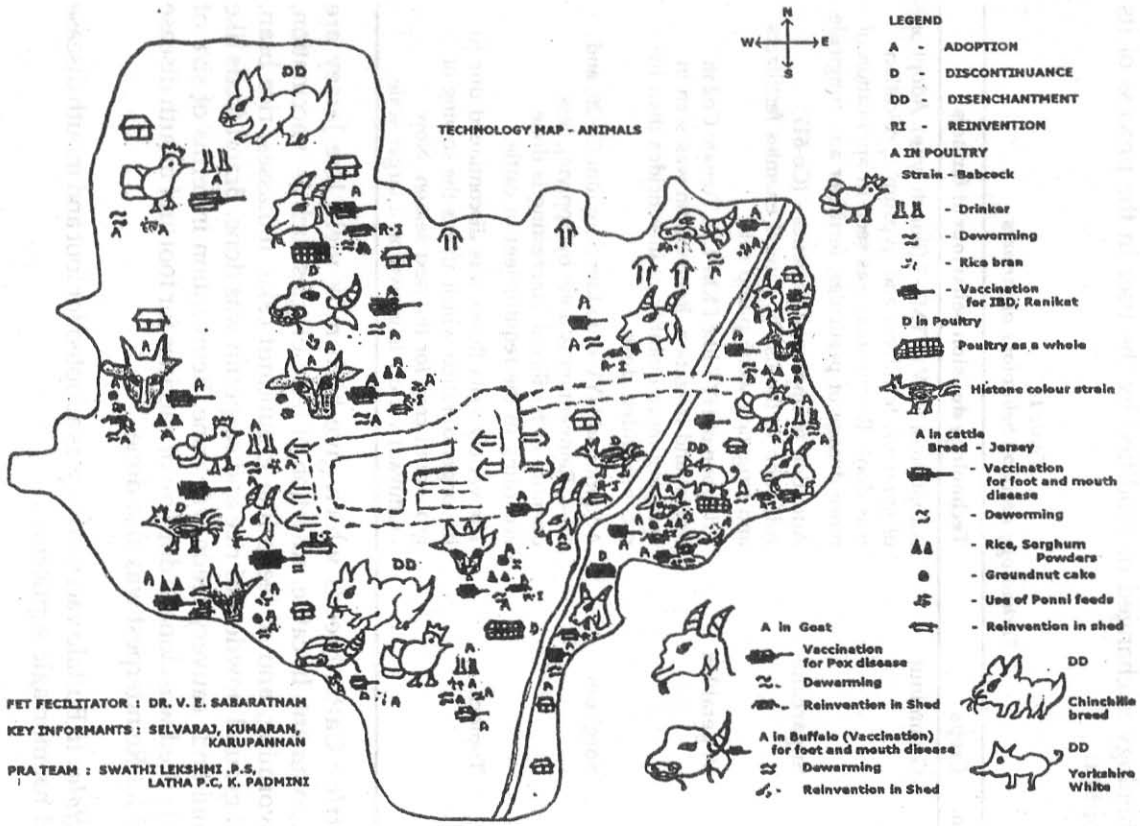

Fig. 2 : Technology Map - Animals

and cage size was done. Reinvention refers to the degree to which a technology is changed or modified by the user in the process of its adoption.

Table 1
Technology decision behaviour of farmers

S.No.	Crops	Technology decision behaviour of farmers
1	Groundnut	Adoption of HYV of TMV-7 (Bunch type). Adoption of sprayers, fertilizers and gypsum application was done. Reinvention was seen in application of more dosage of pesticides, fertilizer and fungicide.
2	Sugarcane	Adoption of improved varieties - (Co-617). Adoption in the use of natural enemies fertilizers and irrigation using pump sets.
3	Vegetables	Adoption of HYV like PKM-1, in Tomato Co2 in Brinjal and irrigation. Reinvention was seen in spraying more quantity of insecticides than the recommended dose.
4	Sorghum	Adoption of HYV of fodder Sorghum Co-26, and Co-4. Reinvention is done by applying less quantity of fertilizers. Harvesting is done according to the requirement of cattle.
5	Topioca	The variety vella Roasa was discontinued due to its longer duration which affects the sowing of groundnut crop for the next season. Now mulluvadi variety is grown on a larger scale.

Cattle : Cattle breeds which give high milk yield like Jersey are predominant. In cattle, adoption of technologies such as vaccination, deworming, and of feeds like groundnut cake, molasses, rice bran, and ground powders of rice and sorghum was done. Brand feeds like ponni and cauvery feeds was done. Reinvention in terms of size of cattle shed was done. Adoption of vaccines for foot and mouth disease and for Reinderpest was also done.

Buffalo : In Buffalo vaccination was adopted for foot and mouth disease and haemorragic septicemia.

Goats : Adoption of vaccination for pox disease was done. Reinvention with respect to shelter and shed facilities was done. Piggery and rabbit rearing are examples of disenchantment discontinuance, as in the case of pigs due to social ostracism and in rabbits due to high feed intake which was uneconomical.

Matrix Ranking : Ranking means placing items or objects or activity in order following a single or joint criteria. The purpose of this ranking is to explore the preferences of individual community members, their ranking criteria, and priorities. It enables us to understand peoples' decision making process according to usefulness and need. This is a very useful technique for systematic comparison of technologies according to locally generated criteria.

Here the technologies are listed horizontally and their respective criteria vertically. So, for a particular criteria, the technology which is being considered important is listed in order of importance and ranked as I, II, III and so forth. For the I rank a score of 10 is given for II-9, III-8 and so on.

The respective column total gives the details, the highest column total gives the technology considered most important by the farmers and the highest row total gives the criteria considered most important by the farmers.

An observation of Table 2 shows the matrix ranking followed for crop based technologies. Firstly 9 technologies which were adopted by the farmers were listed by the farmers and key informants and they were asked to rank the technologies from 1 to 9 in order of their importance and the criteria for adopting the same. Scores from 10 to 2 were given for ranks from I to IX and the row and column total were added up. Thus the results when tabulated and assigned ranks and scores showed that the technology namely fertilizer use was considered as the most important technology by the farmers and relative advantage was considered as the most important criterion by the farmers.

Similarly the results of matrix ranking for animals was tabulated and presented in Table 3. It could be observed that the most important technology adopted by the farmers was improved breed and the most important criteria was high yield.

Consequence Diagram

Technological consequences are the impacts caused by an individual technology in terms of changes that occurred to an individual or to a social system as a result of adoption or rejection of a technology. Development of a technology and the diffusion of the same are only

Table 2
Matrix ranking (crops)
Technologies

Criteria	HYV	Use of fertilizers	Use of pesticides	Use of tractor	Use of borewell	Use of sprayer	Use of biofertilisers	Biological control	Use of serrated sickle	Row total
High yield	I (10)	II (9)	III (8)	-	V (6)	VI (5)	IV (7)	-	-	45
Easy to use	V (6)	I (10)	II (9)	-	VII (4)	III (8)	IV (7)	-	VI (5)	49
Relative advantage	I (10)	II (9)	III (8)	V (6)	VII (4)	IV (7)	VI (5)	VIII (3)	IX (2)	54*
Visibility	IV (7)	I (10)	II (9)	-	-	III (8)	V (6)	VI (5)	-	45
Trialability	I (10)	II (9)	III (8)	-	-	-	IV (7)	V (6)	-	40
Compatible	VI (5)	I (10)	II (9)	V (6)	VII (4)	IV (7)	VIII (3)	-	III (8)	52
Availability	VII (4)	I (10)	II (9)	V (6)	VI (5)	III (8)	VIII (3)	-	IV (7)	52
Resistant to disease	I (10)	II (9)	-	-	-	III (8)	-	-	-	27
Resistant to pests	I (10)	-	II (9)	-	-	III (8)	-	IV (7)	-	34
Column total	72	76$	69	18	23	59	38	21	22	-

**Most important criterion, $ Most important technology*
Sources : Subannan, Manian, Saravanan, Perumal, Subbaraj, Kandasamy, Kaliappan, Chinna, Papathy, Palanisamy

Table 3
Matrix ranking (Animals)

Criteria	Improved breed	Feed	Shelter	Vaccination	Deworming	Use of drinkers	Biogas	Row total
Yield	I (10)	II (9)	-	IV (7)	V (6)	III (8)	-	40*
Disease resistance	II (9)	-	IV (7)	I (10)	III (8)	-	-	34
Easy to breed	I (10)	-	-	-	-	-	-	10
Less feed intake	I (10)	-	-	-	-	-	-	10
Draught purpose	I (10)	II (9)	-	-	-	-	-	19
Control of parasite	III (8)	-	IV (7)	I (10)	II (9)	-	-	34
Dung	II (9)	I (10)	-	-	-	-	III (8)	27
Column total	66$	28	14	27	23	8	8	

**Most important criterion, $ Most important technology*
Sources : Nagamalai, Selvaraj, Ramesh, Anbalagan, Mani, Ramasamy, Kumaran, Mallinga, Kaliammal, Rengasamy

the means to an ultimate end - the consequence of adoption of a technology.

After all, technologies are passed on to the farmers to create favourable effects to the farmer and the surrounding so that the farmer enjoy the benefit of the technology. There are hundreds of studies on diffusion regarding the extent of adoption, reasons for adoption of technologies. The available literature does not suggest the ways and means of finding out, when, what type of consequence would be caused by a particular farm technology.

Even the change agents, their organizations, the extension workers, development officials, and voluntary organizations have conveniently sidelined or ignored the consequences of technologies they introduce to the farmers. Diffusion researchers have studied the technology diffusion process, but have not touched the consequence of technologies. Local people can express their ideas of how a technology may cause impact on their lives in terms of flows, linkages, connections and casualty (Chambers, 1994). Impact diagrams has been drawn to indicate the effect of intervention or adoption of new technologies. The young men in Zimbabwe perceived a number of related impacts (positive and negative) on their lives because of irrigation system.

Impact diagram (crops)

The impact diagram for crops is drawn in figure 3. It could be observed from the diagram that the scarce water resources in the Maroorpatti village had compelled the villagers to raise rainfed crops especially tapioca which is a highly renumerative crop. Its ease of cultivation, lesser water requirement, lesser number of weedings (only up to 5th month) and use as a staple crop has made the crop stay successfully in the village. In addition to its use as staple food, the leaves are used as cattle feed resulting in the saving of the expenditure in cattle feed. Tapioca has proved to be a money-spinner by its use as raw material to Sago industries. Not only that, tapioca cultivation has made positive impact in the village but there are also certain ill effects.

The effluent from Sago industries has led to atmospheric pollution due to the high HCN content in the industrial grade tapioca. The increase in the area under tapioca as monocrop has resulted in the

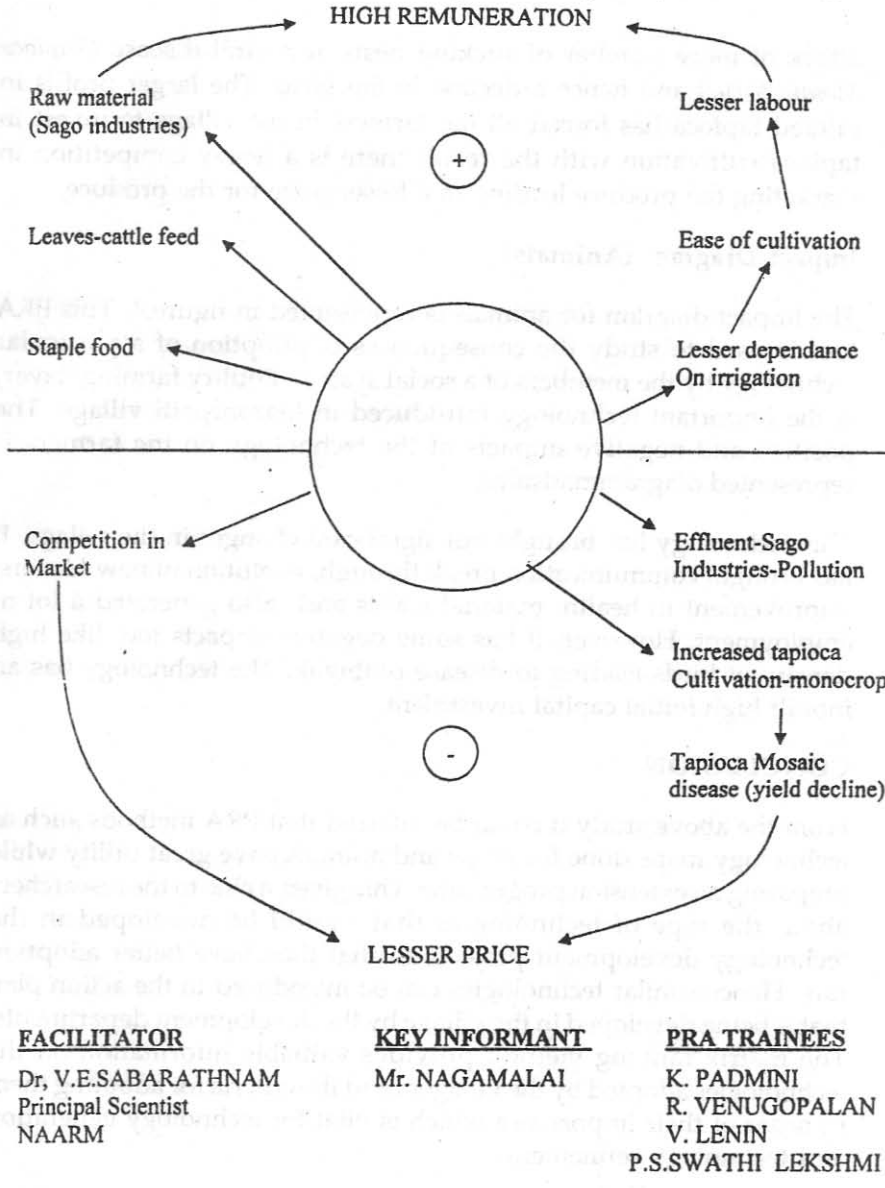

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Fig 3 : Impact Diagram (Crops)

attack of more number of sucking pests and viral disease (*Tapioca Mosaic Virus*) and hence a decline in the yield. The larger profits in rainfed tapioca has forced all the farmers in the village to invest in tapioca cultivation with the result there is a heavy competition in marketing the produce leading to a lesser price for the produce.

Impact Diagram (Animals)

The impact diagram for animals is represented in figure 4. This PRA tool is used to study the consequences of adoption of a particular technology by the members of a social system. Poultry farming (layer) is the important technology introduced in Maroorpatti village. The positive and negative impacts of the technology on the farmers is represented diagrammatically.

This technology has brought out significant changes in the village. It has brought communication break through, evolution of new leaders, improvement in health, material status and also generated a lot of employment. However, it has some negative impacts too, like high density of birds leading to disease outbreak. The technology has an inbuilt high initial capital investment.

CONCLUSION

From the above study it could be inferred that PRA methods such as technology maps done for crops and animals have great utility while preparing an extension programme. This gives a clue to the researchers about the type of technologies that should be developed in the technology development projects so that they have better adoption rate. Hence similar technologies can be introduced in the action plan that is being developed in the village by the development departments. The matrix ranking method provides valuable information on the technologies adopted by the villagers and the criteria for adopting them in order of their importance which is vital for technology generation and technology refinement.

The consequence /impact diagram helps to know the various changes which a technology can cause among the farmers. This will be useful in predicting the consequences of similar technologies so that positive consequences could be promoted and negative consequences could be minimized. It helps the researcher to carefully foresee and weigh

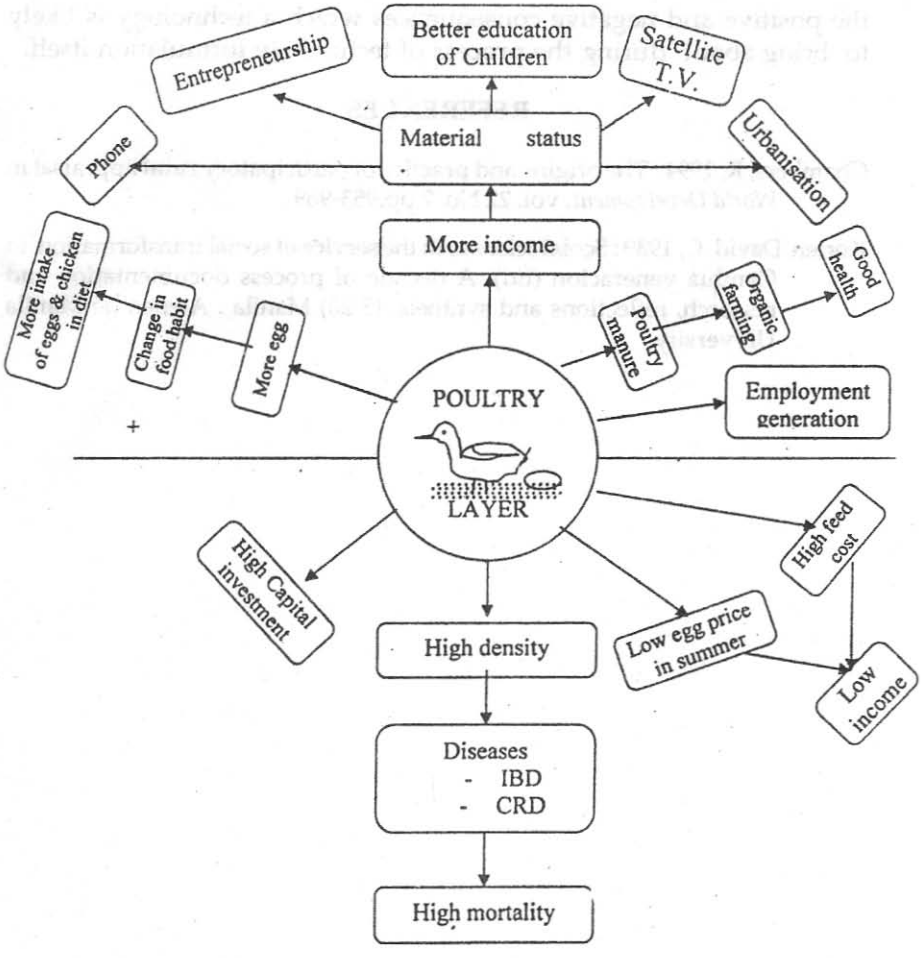

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Fig 4 : Impact Diagram (Animals)

the positive and negative consequences which a technology is likely to bring about during the process of technology formulation itself.

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